CogenPro

http://iac.sdsu.edu

A Free Combined Heat and Power Sizing Software
funded by the Department of Energy, Office of Industrial Technologies

Available CHP Software

- HeatMap CHP - $7,000
- Plant Design Expert - $3,000
- RECIPRO - $1,500
- D-Gen Pro - $900
- Building Energy Analyzer - $500 - $700
- BCHP – price to be determined
- Ready Reckoner – Free
- Process Heating Screening Tool - price to be determined
- SOAPP-CT.25 - $7,500
- GT PRO - $7,500

Microturbine Case Study

A microturbine CHP system was installed at the Navy base in San Diego.

The system is comprised of two 60 kW Capstone microturbines. The exhaust from the two engines is ducted to a heat exchanger that captures the waste heat and generates 350°F hot water. The water is used to heat the Navy Seal swimming pools.

Microturbine Results

Method	Total Electricity Produced (kWh/yr)	Total Costs Savings ($/yr)	Implementation Cost ($)	Simple Payback (yrs)
CogenPro	928,834	67,827	285,000	4.2
D-Gen Pro	1,036,129	75,790	130,020	1.6
Estimated Engineering Results	967,750	78,143	648,460	8.3
Actual Results	937,923	~70,000	648,460*	~9.3

*This equates to $5,400/kW. This does not include the Self-Gen incentive.

Implementation Costs

Fuel Cells							
Number of Projects	Min ($/kW)	Max ($/kW)	Average ($/kW)	Standard Deviation ($/kW)	Confidence Interval ($/kW)	Range Lower Limit ($/kW)	Range Upper Limit ($/kW)
4	5,737	18,000	9,743	5,686	5,572	4,171	15,316

IC Engines							
Number of Projects	Min ($/kW)	Max ($/kW)	Average ($/kW)	Standard Deviation ($/kW)	Confidence Interval ($/kW)	Range Lower Limit ($/kW)	Range Upper Limit ($/kW)
113	1,074	6,803	2,207	873	161	2,046	2,368

Microturbines							
Number of Projects	Min ($/kW)	Max ($/kW)	Average ($/kW)	Standard Deviation ($/kW)	Confidence Interval ($/kW)	Range Lower Limit ($/kW)	Range Upper Limit ($/kW)
51	1,222	5,666	3,242	1,089	299	2,943	3,540

San Diego Regional Energy Office

Incentive category	Incentive offered ($/watt)	Maximum percentage of project cost	Minimum system size (kilowatt)	Maximum system size (megawatt)*	Eligible Technologies
Level 1	$4.50/W	50%	30 kW	1.5 MW	1. Photovoltaics 2. Fuel cells (renewable fuel) 3. Wind turbines
Level 2	$2.50/W	40%	None	1 MW	▪ Fuel cells (non-renewable fuel), must use waste heat recovery
Level 3-R	$1.50/W	40%	None	1.5 MW	▪ Microturbines, small gas turbines, and internal combustion engines, using renewable fuel
Level 3-N	$1.00/W	30%	None	1.5 MW	▪ Microturbines, small gas turbines, and internal combustion engines using waste heat recovery and meeting reliability criteria

* Maximum system size is 1.5 MW, however, incentives are capped at 1.0 MW.

Questions

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